Name: Date:

Exam: Function Reflections (Solution version 43)

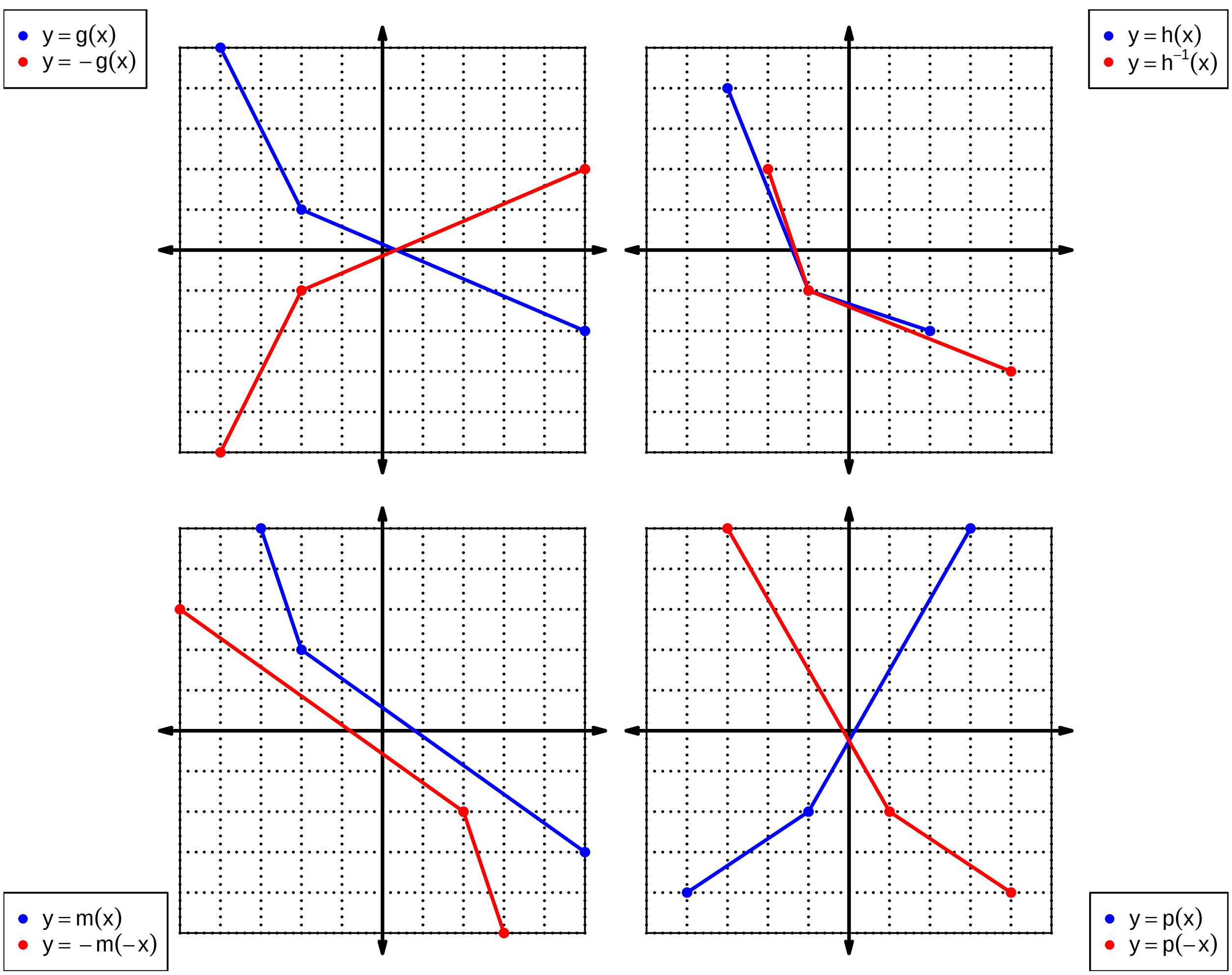
1. Let function f be defined by the polynomial below:

$$f(x) \;=\; 9x^5 + 5x^4 - 6x^3 - 3x^2 - 2x + 7$$

Draw lines that match each function reflection with its polynomial:

Reflections	Polynomials
$-f(-x)$	$-9x^5 - 5x^4 + 6x^3 + 3x^2 + 2x - 7$
$-f(x)$	$-9x^5 + 5x^4 + 6x^3 - 3x^2 + 2x + 7$
$f(-x)$	$9x^5 - 5x^4 - 6x^3 + 3x^2 - 2x - 7$

2. In each xy plane shown below, a function is graphed with blue. Draw the indicated reflections (as a second curve, indicated in legend) with black (or with whatever you have). The x axis is horizontal and the y axis is vertical (as typical), and the scale is equal on both axes.



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For all questions on this page, the functions f, g, and h are defined by the table below.

x	$f(x)$	$g(x)$	$h(x)$
1	1	6	7
2	7	9	1
3	2	1	5
4	8	3	6
5	4	8	2
6	5	7	8
7	3	4	4
8	9	2	3
9	6	5	9

3. Evaluate $h(8)$.

$$h(8) = 3$$

4. Evaluate $f^{-1}(5)$.

$$f^{-1}(5) = 6$$

5. Assuming f is an **even** function, evaluate $f(-9)$.

If function f is even, then

$$f(-9) = 6$$

6. Assuming g is an **odd** function, evaluate $g(-4)$.

If function g is odd, then

$$g(-4) = -3$$

Exam: Function Reflections (Solution version 43)

7. A function, f, is **even** if $f(x) = f(-x)$ for all x in the domain. A function, g, is **odd** if $g(x) = -g(-x)$ for all x in the domain.
   Let polynomial p be defined with the following equation:

$$p(x) \ = \ -x^3 - x$$

   a. Express $p(-x)$ as a polynomial in standard form.

$$\begin{aligned} p(-x) &= -(-x)^3 - (-x) \\ p(-x) &= x^3 + x \end{aligned}$$

   b. Express $-p(-x)$ as a polynomial in standard form.

$$\begin{aligned} -p(-x) &= -\left(x^3 + x\right) \\ -p(-x) &= -x^3 - x \end{aligned}$$

   c. Is polynomial p even, odd, or neither?

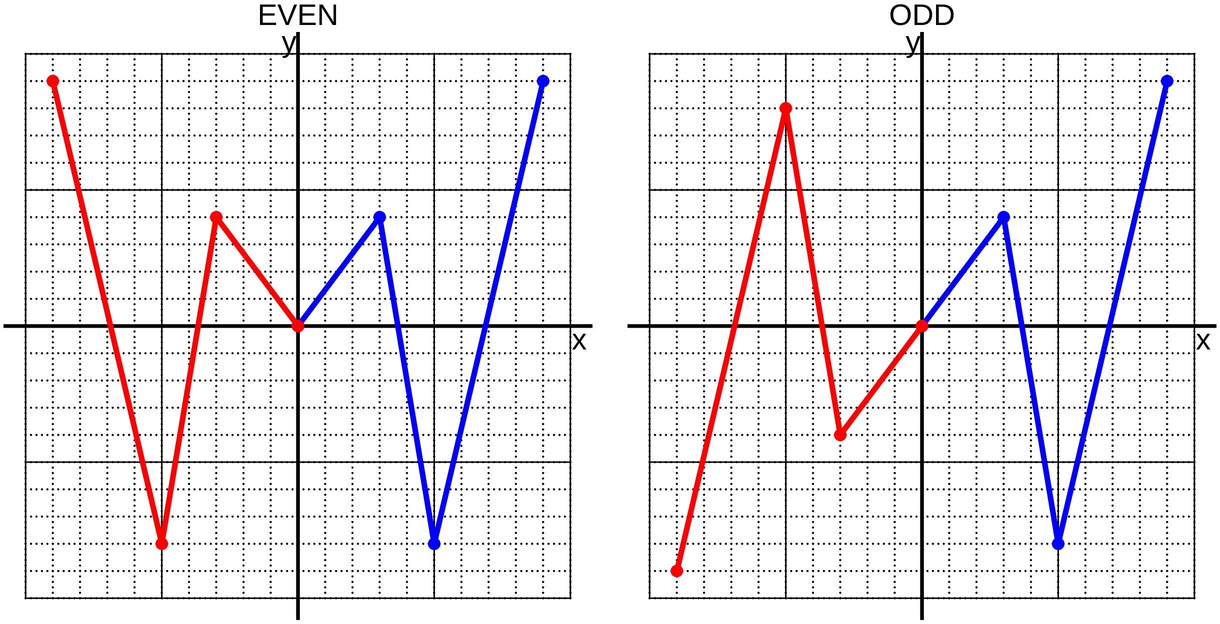
   odd

   d. Explain how you know the answer to part c.

   We see that $p(x) = -p(-x)$ for all x because $p(x)$ and $-p(-x)$ are equivalent polynomials. Thus function p satisfies the criterion for being an odd function.

Exam: Function Reflections (Solution version 43)

8. I have drawn half of a function. Draw the other half to make it even or odd.



9. Let function f be defined with the equation below.

$$f(x) = 9x - 5$$

a. Evaluate $f(8)$.

step 1: multiply by 9
step 2: subtract 5

$$f(8) = 9(8) - 5$$
$$f(8) = 67$$

b. Evaluate $f^{-1}(13)$.

step 1: add 5
step 2: divide by 9

$$f^{-1}(x) = \frac{x+5}{9}$$
$$f^{-1}(13) = \frac{(13)+5}{9}$$
$$f^{-1}(13) = 2$$

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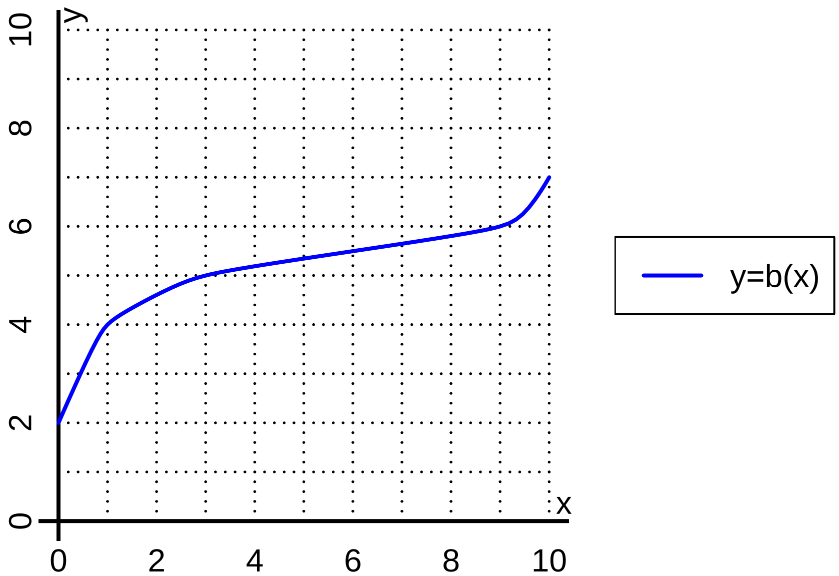
10. The function b is represented by the curve $y = b(x)$ graphed below.



a. Evaluate $b(3)$.

$$b(3) \;=\; 5$$

b. Evaluate $b^{-1}(4)$.

$$b^{-1}(4) \;=\; 1$$

Exam: Function Reflections (Solution version 43)

11. Function f is defined by the table below.

    a. Complete the columns for $-f(x)$ and $f(-x)$ and $-f(-x)$.

x	$f(x)$	$-f(x)$	$f(-x)$	$-f(-x)$
-2	9	-9	9	-9
-1	5	-5	-5	5
0	0	0	0	0
1	-5	5	5	-5
2	9	-9	9	-9

b. Is function f even, odd, or neither?

neither

c. How do you know the answer to part b?

Function f is neither because neither column $-f(-x)$ nor column $f(-x)$ matches column $f(x)$ exactly.